REMARKS

Claims 1, 2, and 5-6 are presently pending in the application.

Claim 1 has been amended to remove the specific combinations of lubricating base oils (A-1) and (A-2), which are now recited in new claim 6. Claim 1 now positively recites that component (D) is a succinimide compound represented by formula (4) and that component (E) is a succinimide compound represented by formula (6). Support for this amendment may be found in the specification at least at page 25, last 3 lines to page 26, line 9; and at page 27, lines 5-12. Components (F) and (G) have been added, which are supported in the specification at least at page 32, last 6 lines; page 37, lines 10-14 and last line to page 38, line 8; and in the Tables. Finally, component (I) has been deleted from claim 1. No new matter has been added by these amendments, and entry is respectfully requested.

In the Office Action, the Examiner has rejected claims 1, 2, and 5 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,617,286 of Sato et al. ("Sato '286") in view of U.S. Patent No. 6,613,722 of Watts ("Watts") and either U.S. Patent No. 6,593,281 of Sato et al. ("Sato '281") or U.S. Patent No. 6,451,745 of Ward ("Ward"). The Examiner has also rejected claims 1, 2, and 5 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,638,897 of Ogano et al. ("Ogano"), optionally in view of Watts, or over U.S. Patent No. 6,730,293 of Bovington et al. ("Bovington") in view of Watts and either Sato '281 or Ward. Applicant respectfully traverses these rejections and the arguments in support thereof for the reasons set forth previously on the record, which Applicant relies upon in full, and for the additional reasons that follow, and respectfully requests reconsideration and withdrawal of the rejections.

The Presently Claimed Invention

The presently claimed invention is directed to a lubricating oil composition having long-lasting anti-shudder properties and long fatigue life, in particular, one which is suitable for automatic transmissions and continuously variable transmissions. Applicant has discovered that prolonged anti-shudder properties and failure life may be remarkably improved by utilizing three types of bis-succinimide compounds: a compound represented by formula (4) in Component (D); a compound represented by formula (6) in Component (E), and a compound represented by

formula (6) in Component (G). The advantageous effects achieved by the combination of the different bis-succinimide compounds may be seen by comparing Inventive Example 2 and Comparative Examples 7-8 in Tables 1-1 and 2-2 of the present application. The sample oil compositions of Comparative Examples 7 and 8, which do not contain Components (D) or (E), did not exhibit satisfactory performance with respect to long-lasting anti-shudder properties and long fatigue life properties.

Rejection Under §103(a) Based on Sato '286 in view of Watts and Sato '281 or Ward

The Examiner again argues that Sato '286 teaches a lubricating oil composition for continuously variable transmissions which comprises a lubricating base oil made of mineral oil and/or a synthetic oil formulated with a phosphorus-based wear preventative (A), a metal detergent additive (B), and an ashless dispersant additive (C), including boron-containing succinimides. Sato '286 allegedly teaches that the base oil component has a kinematic viscosity of 0.5 to 200 mm^2/s at 100°C, preferably 2-25 mm^2/s at 100°C, and that mixtures of mineral oils and synthetic oils may be used in combination. Sato '286 allegedly also teaches that the amount of the additive is within the range of 200-500 ppm as phosphorus based on the total weight of the composition. The Examiner contends that the metal detergent additive (B) includes overbased calcium salicylates having a TBN ranging from 10-450 mg KOH/g, and that the amount of metal detergent is preferably 100-1000 ppm as a metal content based on the total weight of the composition. Finally, the Examiner argues that Sato allows for the addition of other additives to the composition, including non-borated imide ashless dispersants.

The Examiner further argues that Watts teaches that bisimides are well-known in the art as additives to lubricating compositions which are suitable for use in continuously variable transmissions. The non-borated succinimide component is allegedly set forth in col. 10. Thus, the Examiner maintains that Sato '286 in view of Watts teaches all of the claimed elements.

However, in response to Applicant's previous amendments and arguments, the Examiner maintains that friction modifiers are well known in the art as additives to transmission fluids. The Examiner cites Sato '281 as disclosing automatic transmission fluids containing friction modifiers which may be fatty acids, higher alcohols, fatty acid esters, oils and fats, imide compounds, boron-containing cyclic carboxylic acid imides and the like. Ward allegedly

discloses continuously variable transmission fluids comprising friction modifiers, and that suitable friction modifiers include metal salts of fatty acids, fatty phosphites, fatty acid amides, and other compounds. Therefore, the Examiner concludes that it would have been obvious to the skilled artisan to have added a conventional friction modifier as disclosed by Sato '281 or Ward to the compositions set forth in Sato '286 if its known imparted properties were so desired.

Finally, the Examiner takes the position that the results presented in the previously filed Rule 132 Declaration are not sufficient to overcome the *prima facie* case of obviousness. The Examiner notes that the results pertain to specific succinimide compounds represented by formula (4), a bis-succinimide, but that the claims are not so limited. Rather, component (D) of claim (1) may comprise a succinimide of formula (3) and not a bis-succinimide of formula (4). Also, the Examiner argues that Watts teaches bis-succinimides in which the R substituent contains C_6 to C_{30} alkyl groups, which allegedly encompass the claimed R substituents. Accordingly, the Examiner concludes that the results presented in the Declaration are insufficient to rebut the rejection. Applicant respectfully traverses this rejection as follows.

Sato '286 discloses a lubricating oil composition which comprises an ashless dispersant additive including boron-containing succinimides. The Examiner takes the position that Sato allows for the inclusion of other additives to the composition, including non-borated imide ashless dispersants. However, Sato '286 teaches non-borated imide ashless dispersants, but does not specifically teach a boron-free succinimide compound of claimed component (G) as the non-borated imide ashless dispersant.

Further, despite the Examiner's assertion to the contrary, even the proposed combination with Watts would not cure the deficiency with Sato '286. The non-borated succinimide compound taught by Watts corresponds to that of claimed formula (4), but clearly has a different structure from that of claimed component (G) (formula (6)). Applicants note that R_{22} and R_{23} in formula (6) are each independently an alkyl or alkenyl group having 40 to 400 carbon atoms, wherein the alkyl or alkenyl group is a branched alkyl or alkenyl group derived from an oligomer of an olefin or a co-oligomer of ethylene and propylene. In contrast, the R_7 substituents in the Watts compounds are $C_6 - C_8$ alkyl groups, and thus the Watts and claimed compounds are different.

Further, in Example 3 of Sato '286 (Table 1 at cols. 9-10), Sato '286 demonstrates that a boron-free polybutenyl succinimide (succinimide 9), which is analogous to a boron-free succinimide compound of claimed component (G), did not provide the lubricating composition with satisfactory performance (see col. 9, lines 50-53). Accordingly, Sato '286 teaches away from utilizing a boron-free succinimide compound and the non-borated imide ashless dispersants taught by Sato '286 would not include the boron-free succinimide compound of claimed component (G). There would have been no motivation based on Sato '286 to include both boron-containing and boron–free succinimide compounds or to utilize succinimide compounds represented by formulas (4) and (6) as claimed. Finally, since the references of Sato '281 and Ward were only cited by the Examiner as teaching friction modifiers, which are no longer recited in the present claims, these references are no longer relevant and further would not cure the deficiencies with the proposed combination.

For at least these reasons, no *prima facie* case of obviousness has been established based on the proposed combination of Sato '286, Watts, Sato '281, and Ward. Further, it would not have been expected based on Sato '286 in view of Watts that the combination of the specifically claimed succinimide compounds would be very effective at achieving excellent anti-shudder properties and improved fatigue life. Therefore, any case of *prima facie* obviousness which was to be established based on Sato '286 in view of Watts would be overcome by the unexpected results exhibited by the presently claimed invention.

Reconsideration and withdrawal of the §103(a) rejection are respectfully requested.

Rejection Under 35 U.S.C. § 103(a) Based on Ogano and Optionally in view of Watts

The Examiner again argues that Ogano teaches a lubricating oil composition for internal combustion engines comprising a base oil composed of a mineral oil, synthetic oil, or mixtures thereof, incorporated with (A) an overbased calcium salicylate having a TBN in the range of 30-100 mgKOH/g in an amount of 0.05 to 0.90 weight % as calcium and (B) a succinimide selected from: (1) a boron-containing succinimide having a weight-average molecular weight of 3,000 or less at 0.04 weight % or less as boron, (2) a non-borated succinimide having a weight average molecular weight of 3,000 or less at 0.01 to 0.25 weight % as nitrogen, and (3) mixtures thereof. Ogano allegedly teaches that the base oils may be used individually or in combination and have a

kinematic viscosity of 2 to 20 mm^2/s at 100°C. Ogano allegedly allows for the addition of other additives to the compositions, including phosphoric acid esters and phosphorus acid esters as antiwear agents which may be used in amounts of 0.1 to 5% by weight, as well as friction modifiers including fatty acids and fatty acid esters. The Examiner thus concludes that Ogano teaches the claimed elements.

In response to the previously submitted Rule 132 Declaration, the Examiner maintains that, as set forth above with respect to the rejection based on Sato, the results are not sufficient to overcome the rejection because the claims are not limited to compounds represented by formula (4). Further, Ogano allegedly discloses bis-succinimides in which the R substituent contains an oligomer residue of alpha-olefin having a carbon number around 2-8 (structure (II in col. 5), which the Examiner argues clearly encompasses the claimed R substituent. Applicant respectfully traverses this rejection as follows.

Ogano teaches a lubricating oil composition that comprises a boron-containing succinimide compound and/or a boron-free succinimide compound (col. 4, line 64 to col. 6, line 44). Despite the Examiner's assertion to the contrary, the bis-succinimides of Ogano (structure II in col. 5) do not read on the claimed component (D) having formula (4) because the Mw of the boron-free bis-succinimides of Ogano is determined in terms of polybutene (see col. 6, lines 27-29 and col. 9-10 in footnote of Table 1).

Further, even if, *arguendo*, Ogano were to teach the use of boron-free bis-succinimides corresponding to claimed formula (4), Ogano does not teach the use of succinimides of formula (6) (component (G)). That is, Ogano does not teach or suggest the use of three types of succinimide compounds represented by formulas (4) and (6) as components (D), (E), and (G) as claimed. Further, Watts would not cure such deficiencies since, as previously explained, Watts also does not teach or suggest a compound having claimed formula (6).

Claimed component (B) is present in the composition in an amount of 0.005 to 0.07 mass % in terms of calcium. In contrast, Ogano teaches that calcium salicylate overbased with calcium carbonate is incorporated as 0.10 to 0.90 wt% as calcium (col. 4, lines 52-54) and Ogano does not teach or suggest the claimed range.

Regarding component (C), the Examiner argues that Ogano teaches in col. 7 the use of phosphoric acid amines as suitable extreme pressure agents. However, claimed component (C) is

a "sulfur-phosphorus type extreme pressure additive." In col. 7, lines 36-41, Ogano teaches that useful extreme pressure agents include ashless-based sulfide compounds, sulfide fats and greases, phosphoric acid esters, phosphorous acid esters, and phosphoric acid amines. However, Ogano does not teach or suggest sulfur-phosphorus compounds as claimed and therefore does not teach or suggest all of the claimed elements.

In sum, for at least the reasons set forth above, Ogano alone or in view of Watts does not teach or suggest the presently claimed invention. Further, it would not have been expected based on Ogano in view of Watts that the combination of the specifically claimed succinimide compounds would be very effective at achieving excellent anti-shudder properties and improved fatigue life. Therefore, any case of *prima facie* obviousness which was to be established based on Ogano in view of Watts would be overcome by the unexpected results exhibited by the presently claimed invention.

Reconsideration and withdrawal of the § 103(a) rejections based on Ogano alone or in view of Watts are respectfully requested.

Rejection Under §103(a) Based on Bovington in view of Watts and Sato or Ward

Finally, regarding claims 1, 2, and 4, the Examiner again argues that Bovington teaches a low viscosity lubricating oil composition having no more than 0.16 mass % phosphorus, which comprises a lubricating oil basestock and, as additives, (a) from 1-10 mass% of a dispersant including borated and non-borated succinimides, (b) 0.05 to 0.6 mass % elemental calcium derived from one or more detergents, and optional additives including zinc dihydrocarbyl dithiophosphate, an antioxidant, a pour point depressant, and a viscosity modifier. Bovington allegedly teaches that the dispersants contain about 0.01 to 0.1 mass % boron as elemental boron, that the detergent component can have a TBN in the range of 15 to 600, and that suitable detergents include calcium salicylates. Therefore, the Examiner concludes that Bovington teaches the claimed elements.

In response to Applicant's previous amendments and arguments, the Examiner maintains that friction modifiers are well known in the art as additives to transmission fluids. The Examiner again cites Sato '281 as disclosing automatic transmission fluids containing friction modifiers which may be fatty acids, higher alcohols, fatty acid esters, oils and fats, imide

compounds, boron-containing cyclic carboxylic acid imides and the like. Ward allegedly discloses continuously variable transmission fluids comprising friction modifiers, and that suitable friction modifiers include metal salts of fatty acids, fatty phosphites, fatty acid amides, and other compounds. Therefore, the Examiner concludes that it would have been obvious to the skilled artisan to have added a conventional friction modifier, as disclosed by Sato '281 or Ward, to the compositions set forth in Bovington if its known imparted properties were so desired.

The Examiner further takes the position that the results presented in the previously filed Rule 132 Declaration are not sufficient to overcome the *prima facie* case of obviousness, again arguing that the present claims are not limited to compounds having formula (4). Further, the Examiner argues that Bovington discloses as the dispersant component a bis-succinimide having a molecular weight range of 300 to 20,000 for the oil-soluble polymeric hydrocarbon backbone of the dispersant component, which allegedly encompasses the R substituent of the claimed bis-succinimide. Applicant respectfully traverses this rejection as follows.

Bovington teaches a low viscosity lubricating oil composition containing a dispersant, a calcium and/or magnesium detergent, and optionally a zincdihydrocarbyldithiophosphate, viscosity modifier, pour point depressant, and antioxidant. However, Bovington does not teach or suggest at least claimed component (D).

Initially, Applicant respectfully traverses the Examiner's understand of Bovington. The molecular weights taught by Bovington do not relate to the dispersant component, but rather to the oil-soluble polymeric hydrocarbon backbone, i.e., polyisobutenyl (PIB) of the dispersant. Thus, Bovington teaches the use of a non-borated polyisobutenyl (PIB) succinimide dispersant in which the Mw of the polyisobutenyl ranges from 300 to 20,000 (col. 3, lines 49-51). The minimum molecular weight of the PIB of 300 may be used to calculate the minimum molecular weights of the resulting succinimides. Specifically, succinimides are typically prepared from PIB and, as a polyamine, diethylenetriamine (DETA) or tetraethylenepentamine (TEPA). Assuming the molecular weight of the PIB is 300, the molecular weights of the resulting bis-succinimides would be 851 (using DETA) or 939 (using TEPA).

These values are different than the molecular weights of the claimed succinimides prepared from DETA (767) or TEPA (855) when R14 and R15 in formula (4) of component (D) have the longest possible carbon chain of $C_{18}H_{36}$. That is, the Mw of the succinimide having a

Mw of 300 of the PIB of Bovington is still greater than the maximum Mw of the claimed succinimide of component (D), and such a succinimide cannot provide the composition with the good performance as previously demonstrated. In particular, Bovington teaches the favorable use of a polyisobutenyl succinimide as a borated or boron-free succinimide of ashless dispersant wherein the Mn of the polyisobutenyl groups (PIB) is from 950 to 3000 (claim 2, col. 5, lines 31-36) which is far greater than the maximum Mw of the claimed succinimide of component (D). Therefore, even if Bovington discloses a bis-succinimide having a Mw of 300, the disclosure does not teach the succinimides of component (D) having claimed formula (4).

Accordingly, Bovington does not teach or suggest the use of three types of succinimides compounds represented by formulas (4) and (6) as components (D), (E), and (G) as claimed and there would have been no motivation based of Watts to make such a combination of succinimides.

Finally, as previously explained, Bovington certainly did not recognize the effects that are provided by utilizing specific succinimides having low molecular weights. Therefore, it would not have been expected based on Bovington in view of Watts that the addition of the specifically claimed succinimide compound, component (D), is very effective at achieving excellent anti-shudder properties and improved fatigue life and any case of *prima facie* obviousness which were to be established based on Bovington in view of Watts would be overcome by the unexpected results exhibited by the presently claimed invention.

Finally, since the references of Sato '281 and Ward were only cited by the Examiner as teaching friction modifiers, which are no longer recited in the present claims, these references are no longer relevant and further would not cure the deficiencies with the proposed combination.

For at least these reasons, no *prima facie* case of obviousness has been established based on the proposed combination of Bovington, Watts, Sato '281, and Ward, and reconsideration and withdrawal of the §103(a) rejection are respectfully requested.

Based on the preceding Amendments, Remarks, Applicants respectfully submit that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

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